

IN THE CLAIMS:

Please substitute the following claims for the same-numbered claims in the application:

1. (Currently Amended) A method for maintaining and using a query index, wherein queries within said query index have predicate intervals, said method comprising:
 - defining groups of virtual construct intervals, wherein said virtual construct intervals represent predetermined ranges of data values and correspond to specific bit positions in bit map vectors;
 - determining predicate intervals, wherein said predicate intervals represent specified ranges of data values from at least one of subscriptions, queries and rules; and
 - inserting each of said predicate intervals into said bit map positions of at least one of said groups of said virtual construct intervals such that said specified ranges of data values of said predicate intervals are aligned with said predetermined ranges of said data values of said virtual construct intervals;
 - ~~wherein all of said groups of said virtual construct intervals within said query index have the same pattern of different sized of virtual construct intervals.~~
2. (Original) The method in claim 1, wherein each of said groups of virtual construct intervals is adapted to hold multiple predicate intervals, and
 - wherein said groups of virtual construct intervals have uniform lengths, and
 - wherein said predicate intervals have non-uniform lengths.

3. (Original) The method in claim 1, further comprising maintaining locations of said predicate intervals within said groups of virtual construct intervals using a predicate ID bitmap vector.
4. (Currently Amended) The method in claim 1, wherein said process of defining said groups of virtual construct intervals comprises beginning all virtual construct intervals in a group of virtual construct intervals at the a same attribute same data value and ending said virtual construct intervals in said group of virtual construct intervals at different attribute data values.
5. (Cancelled).
6. (Original) The method in claim 1, wherein said process of inserting said predicate intervals into said virtual construct intervals, comprises inserting said predicate interval into the same sized virtual construct interval.
7. (Previously Presented) The method in claim 1, wherein when a predicate interval is larger than any of said virtual construct intervals, said inserting process comprises:
inserting an initial portion of said predicate interval into the largest available virtual construct interval, wherein a length in excess of a length of said initial portion of said predicate interval comprises a remnant predicate interval; and

inserting the remnant predicate interval into the same length virtual construct interval.

8. (Currently Amended) The method in claim 1, wherein said inserting further comprises inserting said predicate intervals such that each of said virtual construct intervals holds multiple predicate intervals, wherein all of said groups of said virtual construct intervals within said query index have the same pattern of different sized virtual construct intervals. ~~event values of said predicate intervals are aligned with the same event values of said virtual construct intervals, such that the same event values of multiple predicate intervals are inserted into the same event value within virtual construct interval.~~

9. (Currently Amended) A method for maintaining and using a query index, wherein queries within said query index have predicate intervals, said method comprising:

defining groups of virtual construct intervals, wherein said virtual construct intervals represent predetermined ranges of data values and correspond to specific bit positions in bit map vectors;

determining predicate intervals, wherein said predicate intervals represent specified ranges of data values from at least one of subscriptions, queries and rules; and

inserting each of said predicate intervals into said bit map positions of at least one of said groups of said virtual construct intervals such that said specified ranges of data values of said predicate intervals are aligned with said predetermined ranges of said data

values of said virtual construct intervals,

wherein each of said groups of virtual construct intervals is adapted to hold multiple predicate intervals,

wherein all of said groups of said virtual construct intervals within said query index have the same pattern of different sized ~~of~~ virtual construct intervals,

wherein said groups of virtual construct intervals have uniform lengths, and

wherein said predicate intervals have non-uniform lengths.

10. (Original) The method in claim 9, further comprising maintaining locations of said predicate intervals within said groups of virtual construct intervals using a predicate ID bitmap vector.

11. (Currently Amended) The method in claim 9, wherein said process of defining said groups of virtual construct intervals comprises beginning all virtual construct intervals in a group of virtual construct intervals at ~~the a~~ a same attribute data value and ending said virtual construct intervals in said group of virtual construct intervals at different ~~attribute~~ data values.

12. (Cancelled).

13. (Original) The method in claim 9, wherein said process of inserting said predicate intervals into said virtual construct intervals, comprises inserting said predicate interval

into the same sized virtual construct interval.

14. (Previously Presented) The method in claim 9, wherein when a predicate interval is larger than any of said virtual construct intervals, said inserting process comprises:

inserting an initial portion of said predicate interval into the largest available virtual construct interval, wherein a length in excess of a length of said initial portion of said predicate interval comprises a remnant predicate interval; and

inserting the remnant predicate interval into the same length virtual construct interval.

15. (Currently Amended) The method of claim 9, wherein said defining process only defines virtual construct intervals that are between the minimum and maximum possible data values of said predicate intervals. ~~event values of said predicate intervals are aligned with the same event values of said virtual construct intervals, such that the same event values of multiple predicate intervals are inserted into the same event value within virtual construct interval.~~

16. (Currently Amended) A method for maintaining and using a query index, wherein queries within said query index have predicate intervals, said method comprising:

defining groups of virtual construct intervals, wherein said virtual construct intervals represent predetermined ranges of data values and correspond to specific bit

positions in bit map vectors;

determining predicate intervals, wherein said predicate intervals represent
specified ranges of data values from at least one of subscriptions, queries and rules; and
inserting each of said predicate intervals into said bit map positions of at least one
of said groups of said virtual construct intervals such that said specified ranges of data
values of said predicate intervals are aligned with said predetermined ranges of said data
values of said virtual construct intervals,

wherein all of said groups of said virtual construct intervals within said query
index have the same pattern of different sized of virtual construct intervals, and

wherein each of said groups of virtual construct intervals is adapted to hold
multiple predicate intervals, and

~~wherein each of said groups of virtual construct intervals covers a unique group of~~
~~event values, and wherein said inserting of said predicate values comprises inserting said~~
~~predicate intervals only into said construct intervals that have corresponding event values.~~

17. (Original) The method in claim 16, further comprising maintaining locations of
said predicate intervals within said groups of virtual construct intervals using a predicate
ID bitmap vector.

18. (Currently Amended) The method in claim 16, wherein said process of defining
said groups of virtual construct intervals comprises beginning all virtual construct
intervals in a group of virtual construct intervals at the a same attribute data value and

ending said virtual construct intervals in said group of virtual construct intervals at different ~~attribute~~ data values.

19. (Cancelled).

20. (Original) The method in claim 16, wherein said process of inserting said predicate intervals into said virtual construct intervals, comprises inserting said predicate interval into the same sized virtual construct interval.

21. (Previously Presented) The method in claim 16, wherein when a predicate interval is larger than any of said virtual construct intervals, said inserting process comprises:

inserting an initial portion of said predicate interval into the largest available virtual construct interval, wherein a length in excess of a length of said initial portion of said predicate interval comprises a remnant predicate interval; and

inserting the remnant predicate interval into the same length virtual construct interval.

22. (Currently Amended) The method in claim 16, wherein said groups of virtual construct intervals have uniform lengths, wherein said predicate intervals have non-uniform lengths and wherein said defining process only defines virtual construct intervals that are between the minimum and maximum possible data values of said predicate intervals. ~~event values of said predicate intervals are aligned with the same event values~~

~~of said virtual construct intervals, such that the same event values of multiple predicate intervals are inserted into the same event value within virtual construct interval.~~

23. (Currently Amended) A method for maintaining and using a query index, wherein queries within said query index have predicate intervals, said method comprising:

defining groups of virtual construct intervals, wherein said virtual construct intervals represent predetermined ranges of data values and correspond to specific bit positions in bit map vectors;

determining predicate intervals, wherein said predicate intervals represent specified ranges of data values from at least one of subscriptions, queries and rules; and

inserting each of said predicate intervals into said bit map positions of at least one of said groups of said virtual construct intervals such that said specified ranges of data values of said predicate intervals are aligned with said predetermined ranges of said data values of said virtual construct intervals,

wherein each of said groups of virtual construct intervals is adapted to hold multiple predicate intervals, and wherein each of said groups of virtual construct intervals covers a unique group of event values,

wherein said inserting of said predicate values comprises inserting said predicate intervals only into said construct intervals that have corresponding event values, and

wherein said defining process only defines virtual construct intervals that are between the minimum and maximum possible attribute data values of said predicate intervals.

24. (Original) The method in claim 23, further comprising maintaining locations of said predicate intervals within said groups of virtual construct intervals using a predicate ID bitmap vector.

25. (Currently Amended) The method in claim 23, wherein said process of defining said groups of virtual construct intervals comprises beginning all virtual construct intervals in a group of virtual construct intervals at the a same attribute data value and ending said virtual construct intervals in said group of virtual construct intervals at different attribute data values.

26. (Cancelled).

27. (Original) The method in claim 23, wherein said process of inserting said predicate intervals into said virtual construct intervals, comprises inserting said predicate interval into the same sized virtual construct interval.

28. (Previously Presented) The method in claim 23, wherein when a predicate interval is larger than any of said virtual construct intervals, said inserting process comprises:
inserting an initial portion of said predicate interval into the largest available virtual construct interval, wherein a length in excess of a length of said initial portion of said predicate interval comprises a remnant predicate interval; and

inserting the remnant predicate interval into the same length virtual construct interval.

29. (Currently Amended) The method in claim 23, wherein said groups of virtual construct intervals have uniform lengths, wherein said predicate intervals have non-uniform lengths and wherein all of said groups of said virtual construct intervals within said query index have the same pattern of different sized virtual construct intervals. ~~event values of said predicate intervals are aligned with the same event values of said virtual construct intervals, such that the same event values of multiple predicate intervals are inserted into the same event value within virtual construct interval.~~

30. (Previously Presented) A service adapted to maintains and use a query index, wherein queries within said query index have predicate intervals, said service:

defining groups of virtual construct intervals, wherein said virtual construct intervals represent predetermined ranges of data values and correspond to specific bit positions in bit map vectors;

determining predicate intervals, wherein said predicate intervals represent specified ranges of data values from at least one of subscriptions, queries and rules; and

inserting each of said predicate intervals into said bit map positions of at least one of said groups of said virtual construct intervals such that said specified ranges of data values of said predicate intervals are aligned with said predetermined ranges of said data values of said virtual construct intervals;

~~wherein all of said groups of said virtual construct intervals within said query index have the same pattern of different sized of virtual construct intervals,~~

~~wherein each of said groups of virtual construct intervals is adapted to hold multiple predicate intervals, and~~

~~wherein each of said groups of virtual construct intervals covers a unique group of event values, and wherein said inserting of said predicate values comprises inserting said predicate intervals only into said construct intervals that have corresponding event values.~~

31. (Original) The service in claim 30, further comprising maintaining locations of said predicate intervals within said groups of virtual construct intervals using a predicate ID bitmap vector.

32. (Original) The service in claim 30, wherein said process of defining said groups of virtual construct intervals comprises beginning all virtual construct intervals in a group of virtual construct intervals at the same attribute value and ending said virtual construct intervals in said group of virtual construct intervals at different attribute values.

33. (Cancelled).

34. (Original) The service in claim 30, wherein said process of inserting said predicate intervals into said virtual construct intervals, comprises inserting said predicate interval into the same sized virtual construct interval.

35. (Previously Presented) The service in claim 30, wherein if when a predicate interval is larger than any of said virtual construct intervals, said inserting process comprises:

inserting an initial portion of said predicate interval into the largest available virtual construct interval, wherein a length in excess of a length of said initial portion of said predicate interval comprises a remnant predicate interval; and

inserting the remnant predicate interval into the same length virtual construct interval.

36. (Currently Amended) The service in claim 30, wherein said groups of virtual construct intervals have uniform lengths, wherein said predicate intervals have non-uniform lengths and wherein said defining process only defines virtual construct intervals that are between the minimum and maximum possible data values of said predicate intervals. ~~event values of said predicate intervals are aligned with the same event values of said virtual construct intervals, such that the same event values of multiple predicate intervals are inserted into the same event value within virtual construct interval.~~

37. (Previously Presented) A system for maintaining and using a query index, wherein queries within said query index have predicate intervals, said system comprising:
a plurality of bitmap vectors which define groups of virtual construct intervals
wherein said virtual construct intervals represent predetermined ranges of data values and

correspond to specific bit positions in said bit map vectors;

a predicate insertion handler adapted to insert each of said predicate intervals into said bit map positions of at least one of said groups of said virtual construct intervals wherein said predicate intervals represent specified ranges of data values from at least one of subscriptions, queries and rules,

wherein said predicate intervals are inserted such that said specified ranges of data values of said predicate intervals are aligned with said predetermined ranges of said data values of said virtual construct intervals;

wherein all of said groups of said virtual construct intervals have the same pattern of different sized of virtual construct intervals;

wherein each of said groups of virtual construct intervals is adapted to hold multiple predicate intervals, and

wherein each of said groups of virtual construct intervals covers a unique group of event values, and wherein said inserting of said predicate values comprises inserting said predicate intervals only into said construct intervals that have corresponding event values.

38. (Original) The system in claim 37, further comprising a predicate ID bitmap vector adapted to maintain locations of said predicate intervals within said groups of virtual construct intervals.

39. (Cancelled).

40. (Original) The system in claim 37, wherein all of said groups of said virtual construct intervals have the same pattern of different sized of virtual construct intervals.

41. (Original) The system in claim 37, wherein said predicate insertion handler inserts said predicate intervals into the same sized virtual construct intervals.

42. (Previously Presented) The system in claim 37, wherein when a predicate interval is larger than any of said virtual construct intervals, said predicate insertion handler:

inserts an initial portion of said predicate interval into the largest available virtual construct interval, wherein a length in excess of a length of said initial portion of said predicate interval comprises a remnant predicate interval; and

inserts the remnant predicate interval into the same length virtual construct interval.

43. (Currently Amended) The system in claim 37, wherein said groups of virtual construct intervals have uniform lengths, wherein said predicate intervals have non-uniform lengths and wherein said defining process only defines virtual construct intervals that are between the minimum and maximum possible data values of said predicate intervals. ~~event values of said predicate intervals are aligned with the same event values of said virtual construct intervals, such that the same event values of multiple predicate intervals are inserted into the same event value within virtual construct interval.~~

44. (Previously Presented) A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform a method for maintaining and using a query index, wherein queries within said query index have predicate intervals, said method comprising:

defining groups of virtual construct intervals, wherein said virtual construct intervals represent predetermined ranges of data values and correspond to specific bit positions in bit map vectors;

determining predicate intervals, wherein said predicate intervals represent specified ranges of data values from at least one of subscriptions, queries and rules; and

inserting each of said predicate intervals into said bit map positions of at least one of said groups of said virtual construct intervals such that said ranges of data values of said predicate intervals are aligned with said predetermined ranges of said data values of said virtual construct intervals;

~~wherein said process of inserting said predicate intervals into said virtual construct intervals, comprises inserting said predicate interval into the same sized virtual construct interval;~~

~~wherein each of said groups of virtual construct intervals is adapted to hold multiple predicate intervals, and~~

~~wherein said groups of virtual construct intervals have uniform lengths, and~~

~~wherein said predicate intervals have non-uniform lengths.~~

45. (Original) The program storage device in claim 44, wherein said method further

comprises maintaining locations of said predicate intervals within said groups of virtual construct intervals using a predicate ID bitmap vector.

46. (Currently Amended) The program storage device in claim 44, wherein said process of defining said groups of virtual construct intervals comprises beginning all virtual construct intervals in a group of virtual construct intervals at ~~the a~~ same ~~attribute~~ data value and ending said virtual construct intervals in said group of virtual construct intervals at different ~~attribute~~ data values.

47. (Original) The program storage device in claim 44, wherein all of said groups of said virtual construct intervals within said query index have the same pattern of different sized of virtual construct intervals.

48. (Cancelled).

49. (Previously Presented) The program storage device in claim 44, wherein when a predicate interval is larger than any of said virtual construct intervals, said inserting process comprises:

inserting an initial portion of said predicate interval into the largest available virtual construct interval, wherein a length in excess of a length of said initial portion of said predicate interval comprises a remnant predicate interval; and

inserting the remnant predicate interval into the same length virtual construct

interval.

50. (Currently Amended) The program storage device in claim 44, wherein said inserting further comprises inserting said predicate intervals such that each of said virtual construct intervals holds multiple predicate intervals, wherein said groups of virtual construct intervals have uniform lengths, wherein said predicate intervals have non-uniform lengths and wherein all of said groups of said virtual construct intervals within said query index have the same pattern of different sized virtual construct intervals. ~~event values of said predicate intervals are aligned with the same event values of said virtual construct intervals, such that the same event values of multiple predicate intervals are inserted into the same event value within virtual construct interval.~~

51. (New) The method of claim 1, wherein said predetermined range intervals of at least some of said virtual construct intervals between and within said groups of construct intervals overlap.

52. (New) The method of claim 9, wherein said predetermined range intervals of at least some of said virtual construct intervals between and within said groups of construct intervals overlap.

53. (New) The method of claim 16, wherein said predetermined range intervals of at least some of said virtual construct intervals between and within said groups of construct

intervals overlap.

54. (New) The method of claim 23, wherein said predetermined range intervals of at least some of said virtual construct intervals between and within said groups of construct intervals overlap.

55. (New) The service of claim 30, wherein said predetermined range intervals of at least some of said virtual construct intervals between and within said groups of construct intervals overlap.

56. (New) The system of claim 37, wherein said predetermined range intervals of at least some of said virtual construct intervals between and within said groups of construct intervals overlap.

57. (New) The program storage device of claim 44, wherein said predetermined range intervals of at least some of said virtual construct intervals between and within said groups of construct intervals overlap.